POTATO YIELD AND DRY MATTER RESPONSE TO DIFFERENT SOURCES OF POTASSIUM FERTILIZER IN ENGLAND

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INTRODUCTION
• Potassium nutrition for potatoes is critical for yield, quality and marketability, with an average of 221 kg K₂O ha⁻¹ applied to potato crops in the UK.
• Potassium and magnesium are two key nutrients required for potatoes, which can have restricted availability to the plant due to the ionic antagonism of the potassium and magnesium that in turn limits yields.
• There is an enhanced interest in the usage of polyhalite (K₂SO₄·MgSO₄·2CaSO₄·2H₂O; POLY4) due to the recent successful exploration for polyhalite in North Yorkshire. The ratio of potassium to magnesium in POLY4 appears favourable for potato growers but limited information is available on POLY4’s performance on potatoes in Europe.
• POLY4 is an alternative potassium source to MOP and SOP, with an advantage in terms of chloride content, cost, availability and delivery of Mg and Ca.

OBJECTIVES
• To generate and compare the potassium rate response curves of MOP, SOP and POLY4.
• To understand whether MOP and POLY4 combinations perform better than MOP and N+P control practises for tuber yield and dry matter percentage.

METHODOLOGY
• The trial was established on loamy soils in Staffordshire, England with an initial soil analysis of P 28 mg kg⁻¹, K 106 mg kg⁻¹ and Mg 44 mg kg⁻¹.
• The genotype planted was Pentland Dell.
• Statistical analysis was carried out using GenStat software version 17 (VSN International, 2011) using ANOVA and regression analysis. Treatments of interest in the source study were compared using a single degree of freedom contrasts.

RESULTS – RATE RESPONSE STUDY
• Potassium application irrespective of source significantly improved potato yield above the control (N+P).
• No significant differences were observed between MOP, SOP or POLY4. However, potato yields were 2% (1.2 t ha⁻¹) (mean of the 100, 200, 300 and 400 kg K₂O ha⁻¹) higher for POLY4 treatments than the MOP or SOP treatments.

RESULTS – POTASSIUM COMBINATIONS STUDY AT RECOMMENDED K₂O RATE
• All of the treatment combinations containing both MOP and POLY4 significantly outperformed the control (N+P) except for the 100% K source (MOP) which performed on par. This could be due to the addition of magnesium, calcium and sulphur in POLY4.
• The results suggest that the ratio and source of magnesium to potassium is more important to consider than the application of additional MgO.

CONCLUSION
• The rate response study of potassium fertilizers showed POLY4 to be more effective at improving yields than MOP but similar to SOP.
• Decreasing dry matter percentage with increasing K₂O rate was observed for MOP but not for SOP or POLY4 treatments.
• POLY4 and MOP combinations recorded numerically higher yields than the 100% K source (MOP).